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THE INTERACTION OF NATIVE DNA WITH Ni(II), Cu(II) and Zn(II) COMPLEXES OF 5-TRIETHYL AMMONIUM METHYL SALICYLIDENE ORTHO-PHENYLENDIIMINE

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This communication will give an account of recent studies on the interaction of native calf thymus DNA with the cationic Ni(II), Cu(II) and Zn(II) complexes of 5-triethyl ammonium methyl salicylidene ortho-phenylendiimine (H_2L^{2+}), see Figure 1, in 1 mM Tris-HCl aqueous solutions at neutral pH. The title interaction has been monitored as a function of the metal complex-DNA molar ratio by UV absorption spectrophotometry, circular dichroism (CD) and fluorescence spectroscopy [1,2].

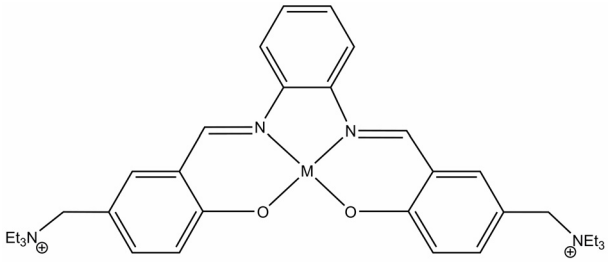

Figure 1: Structure of the ML^{2+} complexes (M = Ni, Cu, Zn)

The remarkable modifications of the DNA CD spectrum, the appearance of a broad induced CD band in the range 350-450 nm, the strong increase of the DNA melting temperature (T_m), the fluorescence quenching of ethidium bromide-DNA solutions in the presence of increasing amounts of the metal complexes, and the high values of the intrinsic binding constants (K_b) determined by UV spectrophotometric titrations, support the existence of a tight intercalative interaction of the three metal complexes with DNA.

The interaction of CuL^{2+} with native DNA has been also investigated in reverse micelles, constituting nanoscopic domains biomimetic of the intra-cellular environment [3]. The results of this study indicate the occurrence of dramatic structural changes of both the DNA and the metal complex-DNA system, when going from aqueous solution to the micellar phase [3].

The interaction of ZnL^{2+} with DNA has been recently revisited, in consideration of the photophysical processes induced on the zinc complex by visible light. Steady state and time-resolved fluorescence spectroscopy measurements, supported by quantum chemical calculations, point out that ZnL^{2+} is effectively protected by DNA from photoinduced redox phenomena, which occur when it is in the free state dispersed in aqueous buffer solution.

[1] G. Barone et al., J. Inorg. Biochem., in press, doi:10.1016/j.jinorgbio.2009.01.006.
[2] A. Silvestri et al., J. Inorg. Biochem., **2007**, *101*, 841-848.
[3] G. Barone et al., Dalton Trans., **2008**, 4172-4178.